

*An Account of the Trigonometrical Survey, carried on in the Years 1797, 1798, and 1799, by Order of Marquis Cornwallis, Master-General of the Ordnance. By Captain William Mudge, of the Royal Artillery, F.R.S. Communicated by His Grace the Duke of Richmond, F.R.S. Read July 3, 1800. [Phil. Trans. 1800, p. 539.]*

The mode of conducting this important survey having been already noticed in the Journals of the Society on various former occasions, it will only be necessary here to state the progress of the operation, which we find has now been carried on over Essex, the western part of Kent, Suffolk, and Hertfordshire, and portions of the counties contiguous to them. A distinct section contains the calculations of the sides of the principal and secondary triangles extended over the country in the three abovementioned years, together with an account of the measurement of a new base-line on Sedgemoor, and a short historical narrative of each year's operations. Another section contains the computed latitudes and longitudes of the places on the western coast intersected in 1795 and 1796, and also of such others since determined as lie conveniently situated to the newly observed meridians. Here we find likewise the directions of those meridians; one on Blackdown in Dorsetshire, another on Butterton Hill in Devonshire, and another on St. Agnes Beacon in Cornwall; as also the bearings, distances, &c. of the stations and intersected objects from the several ascertained parallels and meridians.

*The Croonian Lecture. On the Irritability of Nerves. By Everard Home, Esq. F.R.S. Read Nov. 20, 1800. [Phil. Trans. 1801, p. 1.]*

Its object is principally to investigate the opinion hitherto entertained, that the nerves may be considered as chords that have no power of contraction within themselves, but only serve as a medium by means of which the influence of the brain may be communicated to the muscles, and the impressions made upon the different parts of the body may be conveyed to the brain. After pointing out the extreme difficulty of such an inquiry, owing to the few opportunities that offer for investigating the real state of the nerves in the living body, Mr. Home intimates that he resolved to avail himself of every opportunity that might offer of any operation in surgery performed upon nerves, either in a healthy state, or under the influence of disease, in order to elucidate this intricate point, without neglecting certain experiments he thought he could devise upon animal bodies, before they are wholly deprived of life.

The first case, which explains some circumstances respecting the actions of the nerves when under the influence of disease, was that of a middle-aged person, who, having hurt his thumb by a fall, experienced long after an occasional swelling and convulsions in that part, attended with spasms, which at times extended in the direct course of the trunks of the radial nerve up to the head, the patient being at times afflicted with absolute insensibility. In order to put a stop to

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the progress of this irritation, which seemed to constitute the disease, it was proposed to divide the nerve as it passes from under the annular ligament of the wrist. This operation was accordingly performed, but not altogether with the desired success, owing probably to the wound not healing by the first intention.

Among several singular circumstances in this case, we find also a retraction which took place in the cut ends of the nerve at the time of the operation; and the first idea that suggested itself, was to endeavour to ascertain whether this effect arose from an increase of a natural action in the nerves, or of one newly acquired and entirely produced by the disease. Various experiments were accordingly made on the cutaneous nerves of rabbits, and the phrenic nerve of horses immediately after they were killed. The results were, that a considerable retraction *always* took place, and that any action the nerves are capable of exciting is nearly as strong after apparent death has taken place from a violence committed upon the brain (the horses having been killed by such means), as while the animal is in perfect health.

As it might be suspected that the cellular membrane is the agent by which this retraction of the divided nerves is produced, further experiments were made in such a way as to prevent any other surrounding part from acting upon the nerve. Other experiments were also attempted, with a view to determine whether the power of contraction in a nerve continues for any length of time after apparent death has taken place, and also to ascertain what proportion of elasticity may be possessed by the nerves. The results were,—1. That in all cases the nerves of an animal in health are capable of retracting themselves when divided, and that this effect is entirely independent of the parts by which they are surrounded. 2. That this contraction takes place in the nervous fibres themselves, and is independent of the brain from which they originate, and the muscles and other parts in which they terminate. 3. That the contracted nerve exhibits to the eye an appearance of contraction (a serpentine or undulated direction), which does not appear when the nerve is in a relaxed state.

As the nerves are so easily influenced by electricity in exciting the muscles to action, it naturally suggested itself that some further information might be obtained in the present investigation, by means of experiments made upon the nerves by the electric fluid. From a number that were made for the purpose, it appeared that when the nerve had been previously contracted in consequence of being divided, no increase of that contraction was produced by the electric fluid, nor was any sensible effect perceived when the nerve had not been previously irritated.

During this investigation a singular case occurred, from which it appears that electricity is capable of depriving a nerve of all its functions for a certain time, without destroying them entirely. A young woman, while in the act of bolting the window-shutter, was struck across the eyes by lightning, and a second flash struck her a few minutes after, while she was rubbing her eyes with her hand having a

thimble on one of the fingers. This deprived her of sight for ten days, after which, having had a severe hysterical paroxysm, her vision returned, but convulsive and hysterical sensations still remained, from which she was not relieved till six weeks after. This case, which the author conceives to be a proof that the electric fluid is capable of suspending the functions of the optic nerve without altogether destroying them, suggested the idea of some further experiments, with a view to ascertain whether electricity could be so applied, by artificial means, as to destroy the power of contraction possessed by nerves. The effects seemed to prove the negative; but it is owned these experiments were made under circumstances which did not inspire much confidence.

It appears, in general, that these experiments, and the observations deduced from them, materially illustrate an action or power inherent in the nervous chords, capable of producing the symptoms which occurred in the cases here related; and that the once favourite hypothesis of a nervous fluid, does not give a satisfactory solution of those nervous agitations, which only proceed for some way in the course of a nerve, and are there arrested without being allowed to proceed to the brain. The disorder known by the name *Tic Douloureux*, is given as an example of the manner in which spasmodic tremors are propagated along the nerves. And a case of a locked jaw occasioned by an injury to the thumb, is lastly mentioned, which corroborates all that has been said concerning the first case mentioned in this paper.

*The Bakerian Lecture. On the Mechanism of the Eye. By Thomas Young, M.D. F.R.S. Read Nov. 27, 1800. [Phil. Trans. 1801, p. 23.]*

The copious contents of this lecture relate chiefly to the power possessed by the eye to accommodate itself to the perception of objects at different distances, concerning which a variety of opinions have been entertained.

After some general considerations on the sense of vision, from which it appears that though the extent of the field of perfect vision for each position of the eye be not very great, yet there is reason to believe that its refractive powers are calculated to take in a moderately distinct view of a whole hemisphere: the author, aware how essential it is in an inquiry of so delicate a nature to proceed upon solid, and as far as possible incontrovertible grounds, delivers a set of dioptrical propositions (eight in number), each accompanied by some scholia and corollaries, from which he means to deduce the principal inferences brought forward in the sequel of the lecture.

The nature of these can only be here intimated by their different enunciations, some of which may appear elementary, yet lead to results of a less obvious nature. They are as follows;—1. In all refractions the ratio of the sine of the angle of incidence to the sine of the angle of refraction, is constant. 2. If between two refracting mediums a third medium, terminated by parallel surfaces, be inter-